

POSITIONS AND AREAS OF SUN SPOTS—Continued

Date	Eastern standard civil time	Heliographic			Area		Total area for each day
		Diff. long.	Longi- tude	Lat- itude	Spot	Group	
1933							
Feb. 10 (Naval Observatory).....	<i>h. m.</i> 11 18	° +41.0	° 301.0	° +13.0		710	
Feb. 11 (Naval Observatory).....	11 0	+69.0	329.0	+9.0	62		772
Feb. 12 (Naval Observatory).....	12 14	+56.0	303.0	+13.0		679	679
Feb. 13 (Perkins Observatory).....	12 30	+70.0	303.1	+13.0		556	556
Feb. 14 (Mount Wilson).....	14 10	+86.0	305.8	+5.0		125	125
Feb. 15 (Mount Wilson).....	17 35	-57.0	148.7	+1.0		4	4
Feb. 16 (Naval Observatory).....	11 29	-41.0	149.7	+1.0		3	3
Feb. 17 (Mount Wilson).....	12 30	No spots.					
Feb. 18 (Naval Observatory).....	12 22	No spots.					
Feb. 19 (Naval Observatory).....	11 24	No spots.					
Feb. 20 (Perkins Observatory).....	12 30	No spots.					
Feb. 21 (Naval Observatory).....	10 51	No spots.					
Feb. 22 (Naval Observatory).....	11 10	No spots.					
Feb. 23 (Naval Observatory).....	11 18	No spots.					
Feb. 24 (Naval Observatory).....	11 15	No spots.					
Feb. 25 (Perkins Observatory).....	15 35	No spots.					
Feb. 26 (Naval Observatory).....	13 4	No spots.					
Feb. 27 (Naval Observatory).....	11 40	-63.0	332.9	+7.0	31		31
Feb. 28 (Naval Observatory).....	11 29	-72.0	310.8	+16.0	123		123
Mean daily area for February.....							437

PROVISIONAL SUN-SPOT RELATIVE NUMBERS FOR FEBRUARY, 1933

[Dependent alone on observations at Zurich and its station at Arosa]
[Data furnished through the courtesy of Prof. W. Brunner, University of Zurich, Switzerland]

February 1933	Relative numbers	February 1933	Relative numbers	February 1933	Relative numbers
1	ad 45	11		21	0
2		12	16	22	0
3	67	13	11	23	0
4		14	8	24	0
5	a 62	15	0	25	0
6	b 69	16	0	26	0
7	b 80	17	0	27	8
8	53	18	0	28	d 14
9	46	19	0		
10	32	20	0		

Mean: 25 days=20.4.

a= Passage of an average-sized group through the central meridian.
b= Passage of a large group or spot through the central meridian.
c= New formation of a center of activity: E. on the eastern part of the sun's disk; W. on the western part; M. in the central zone.
d= Entrance of a large or average-sized center of activity on the east limb.

AEROLOGICAL OBSERVATIONS

[Aerological Division, W. R. Gregg, in charge]

By L. T. SAMUELS

Free-air temperatures during February were considerably below normal at the northern stations with the largest departures occurring at Ellendale. Temperatures at the southern stations averaged above normal with the largest departures at Atlanta. Table 1 shows that, contrary to the usual inverse relationship between the monthly temperature and relative humidity departures, this relationship was direct at most stations. Under such conditions there often is found a correlation between the monthly precipitation and relative humidity departures. Such a relationship was strikingly apparent at those stations having temperature and relative humidity

departures of the same sign, e.g., Chicago, -0.92 in.; Atlanta, +0.87 in.; Omaha, -0.64 in.; Cleveland, -0.52 in.; and Dallas, +0.34 in.

As would be expected from the fact that the normal latitudinal temperature gradient was intensified by the super-normal temperatures over the south and subnormal temperatures over the north, the resultant wind velocities for the month were considerably above normal. Resultant free-air wind directions were close to normal over most of the country. The greatest deviations occurred over the north Pacific States where the normal southwesterly component was replaced by one from the northwest.

TABLE 1.—Free-air temperatures and relative humidities during February 1933

TEMPERATURE (°C.)

Altitude (meters) m.s.l.	Atlanta, Ga. (303 meters) ¹		Boston, Mass. (6 meters) ²		Chicago, Ill. (187 meters) ³		Cleveland, Ohio (246 meters) ³		Dallas, Tex. (146 meters) ⁴		Ellendale, N. Dak. (444 meters)		Omaha, Nebr. (300 meters) ⁵		San Diego, Calif. (9 meters) ⁶		Washington, D.C. (2 meters) ⁶	
	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal	Mean	Departure from normal
Surface.....	5.4	(?)	-0.6		-6.5	(?)	-3.4	(?)	4.2	(?)	-12.1	-2.4	-6.0		10.1	-2.5	.0	-1.7
500.....	5.9	(?)	-4.0		-6.2	(?)	-4.1	(?)	5.3	(?)	-12.3	-2.6	-6.1	(?)	10.5	-1.3	.3	-1.7
1,000.....	5.9	0	-5.4		-6.8	-3.0	-6.4	-2.6	5.6	-1.6	-11.5	-2.9	-4.1	-0.7	8.8	-1.4	-.4	+2
1,500.....	5.8	+1.8	-7.1		-8.0	-3.2	-7.6	-2.8	5.2	-7	-12.4	-4.3	-4.4	-1.4				
2,000.....	4.5	+2.4	-8.9		-9.3	-3.0	-8.8	-2.5	4.7	+7	-14.1	-4.6	-6.4	-2.1	4.3	-1.1	-2.9	+6
2,500.....	2.7	+3.0	-11.0		-11.6	-3.4	-10.8	-2.6	2.3	+7	-16.9	-5.1	-6.7	-2.2				
3,000.....	.6	+3.4	-13.3		-14.4	-3.8	-13.4	-2.8	-.1	+8	-19.3	-4.8	-11.4	-2.3	-.7	-1.3	-6.8	+8
4,000.....	-5.4	+3.2	-19.0		-19.3	-2.8	-19.1	-2.6	-5.5	+3			-17.6	-2.9			-11.2	+2.8
5,000.....	-12.1	+2.1	-26.3		-25.7	-2.7	-26.2	-3.2	-12.4	-9			-23.9	-2.4				

RELATIVE HUMIDITY (PERCENT)

Surface.....	83	(?)	68		78	(?)	75	(?)	82	(?)	76	-5	72	(?)	67	-1	71	0
500.....	82	(?)	66		72	(?)	73	(?)	74	(?)	75	-5	66	(?)	59	-3	62	-1
1,000.....	80	-20	64		64	-7	70	-1	61	-2	68	-2	54	-10	51	-4	56	-4
1,500.....	70	+14	61		59	-3	62	0	54	+2	65	+3	49	-8				
2,000.....	64	+11	59		52	-5	55	-2	47	0	64	+5	45	-8				
2,500.....	62	+11	57		48	-8	50	-6	46	+2	65	+6	41	-11	40	-3	52	-1
3,000.....	58	+9	54		47	-10	52	-5	45	+3	60	+2	41	-11	30	-1	52	+2
4,000.....	54	+8	51		47	-10	50	-7	41	+5			45	-5			54	+3
5,000.....	49	+3	49		47	-11	55	-3	40	+8			41	-9				

Weather Bureau airplane observations made near 5 a.m.; Navy airplane observations near 7 a.m.; Ellendale kite observations near 9 a.m. (seventy-fifth meridian time).

¹ Temperature and humidity departures based on normals of Due West, S.C.

² Airplane observations made by Massachusetts Institute of Technology.

³ Temperature and humidity departures based on normals of Royal Center, Ind.

⁴ Temperature departures based on normals determined by interpolating between those of Groesbeck, Tex., and Broken Arrow, Okla. Humidity departures based on normals of Groesbeck, Tex.

⁵ Temperature and humidity departures based on normals of Drexel, Nebr.

⁶ Naval air stations.

⁷ Surface and 500-meter departures omitted because of difference in time of day between airplane observations and those of kites upon which the normals are based.

TABLE 2.—Free-air resultant winds (meters per second) based on pilot balloon observations made near 7 a.m. (E.S.T.) during February 1933

[Wind from N=360°; E=90°, etc.]

Altitude (meters) m.s.l.	Albuquerque, N. Mex. (1,551 meters)		Atlanta, Ga. (309 meters)		Bismarck, N. Dak. (518 meters)		Brownsville, Tex. (12 meters)		Burlington, Vt. (132 meters)		Cheyenne, Wyo. (1,873 meters)		Chicago, Ill. (192 meters)		Cleveland, Ohio (245 meters)		Dallas, Tex. (154 meters)		Havre, Mont. (762 meters)		Jacksonville, Fla. (14 meters)		Key West, Fla. (11 meters)													
	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity												
Surface	°	357	1.2	°	320	1.6	°	306	2.2	°	89	0.6	°	222	1.7	°	273	5.8	°	276	2.3	°	245	3.6	°	257	0.2	°	242	4.2	°	343	1.6	°	93	2.2
500																																				
1,000																																				
1,500																																				
2,000	310	3.3																																		
2,500	291	5.9																																		
3,000	282	9.1																																		
4,000	274	14.5																																		
5,000	264	14.7																																		

Altitude (meters) m. s. l.	Los Angeles, Calif. (217 meters)		Medford, Oreg. (410 meters)		Memphis, Tenn. (83 meters)		New Orleans, La. (25 meters)		Oakland, Calif. (8 meters)		Oklahoma City, Okla. (402 meters)		Omaha, Nebr. (306 meters)		Phoenix, Ariz. (356 meters)		Salt Lake City, Utah (1,294 meters)		Sault Ste. Marie, Mich. (193 meters)		Seattle, Wash. (14 meters)		Washington, D.C. (10 meters)													
	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity												
Surface	°	343	1.4	°	290	0.6	°	277	0.5	°	37	1.8	°	28	1.8	°	308	0.7	°	233	0.7	°	89	0.3	°	178	1.9	°	285	1.0	°	148	2.0	°	275	1.9
500	19	1.4																																		
1,000	29	2.1																																		
1,500	355	2.8																																		
2,000	338	4.1																																		
2,500	330	6.4																																		
3,000	337	6.7																																		
4,000	338	5.7																																		
5,000																																				

RIVERS AND FLOODS

By MONTROSE W. HAYES

[In charge River and Flood Division]

In February 1933 floods occurred in Michigan, the South Atlantic, Gulf, and Ohio Valley States, and in Oregon and Idaho. Several of those in the South Atlantic and Gulf States were still in progress at the close of the month. With the exception of the one in the Tallahatchie River, in Mississippi, which will be discussed in a later issue of the MONTHLY WEATHER REVIEW, none was of much importance. In all instances the damage was slight.

The floods in the Grand River in Michigan were caused by ice gorges.

Table of flood stages in February 1933
[All dates in February unless otherwise specified]

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
ST. LAWRENCE DRAINAGE					
Grand: Portland, Mich.....	<i>Feet</i> 12	26	26	<i>Feet</i> 12.0	26.
ATLANTIC SLOPE DRAINAGE					
Roanoke: Williamston, N.C.....	10	15	28	10.5	19-27.
Peedee:					
Mars Bluff Bridge, S.C.....	17	13	26	18.6	24.
Poston, S.C.....	18	18	28	18.4	23-26.
Black: Kingstree, S.C.....	10	12	Mar. 1	11.2	19, 20.
Santee:					
Rimini, S.C.....	12	Jan. 26 9	(1) 5	13.7 15.2	Jan. 29. 24.
Ferguson, S.C.....	12	Jan. 26 9	(1) 7	13.3 13.7	Jan. 31. 24-27.
Savannah: Ellenton, S.C.....	14	Jan. 26 9	(1) 6	17.5 19.5	Jan. 29. 23.

Table of flood stages in February 1933—Continued

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
ATLANTIC SLOPE DRAINAGE—contd.					
Ogeechee:	<i>Feet</i>			<i>Feet</i>	
Dover, Ga.....	7	8	(1)	8.1	22-24.
Meldrim, Ga.....	9	9	(1)	10.6	26-28.
Ocmulgee: Abbeville, Ga.....	11	16	19	11.3	18.
	{	23	(1)	13.4	27.
Altamaha:					
Charlotte, Ga.....	12	Jan. 28	(1)	16.5	28.
Everett City, Ga.....	10	11	(1)	10.8	21-25.
EAST GULF OF MEXICO DRAINAGE					
Apalachicola: Blountstown, Fla.....	15	Jan. 28	(1)	20.4	25.
Cahaba: Centerville, Ala.....	23	8	8	23.7	8.
	{	20	20	25.0	20.
Alabama:					
Selma, Ala.....	35	22	26	38.2	24.
Millers Ferry, Ala.....	35	21	(1)	42.4	25, 26.
Tombigbee:					
Aberdeen, Miss.....	34	9	10	34.5	10.
Lock No. 4, Demopolis, Ala.....	39	10	Mar. 3	49.5	22.
Lock No. 3, Ala.....	33	9	Mar. 5	52.4	22.
Lock No. 2, Ala.....	46	12	Mar. 3	54.4	23.
Lock No. 1, Ala.....	31	11	Mar. 9	37.0	25, 26.
Pearl: Jackson, Miss.....	20	8	(1)	25.0	16, 17.
West Pearl: Pearl River, La.....	13	1	7	14.1	2.
	{	14	(1)	15.2	28.
MISSISSIPPI SYSTEM					
Upper Mississippi Basin					
Illinois: Peru, Ill.....	14	Jan. 22	5	14.8	4.
	{	8	20	15.4	8.
		23	Mar. 5	16.5	24.
Ohio Basin					
Barren: Bowling Green, Ky.....	20	21	23		

1 Continued into March.